

In re Patent Application of:

CHARLES CARPENTER

Serial No. 09/864,918

Filing Date: 5/24/2001

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In the Claims:

1. (Previously Presented) A method for manufacturing an array of hermetically sealed surface acoustic wave (SAW) devices, the method comprising the steps of:
 - forming a unitary array of a material having opposing first and second surfaces and a plurality of spaced cavities extending into the array from the first surface;
 - forming a recess from the first surface around selected cavities;
 - providing at least two conductive paths from within each selected cavity to at least one of the first and second surfaces of the array;
 - inserting and attaching a SAW die face down, in a flip-chip arrangement, into at least some of the selected cavities, each SAW die having conductive means electrically contacting the at least two conductive paths within the corresponding cavity;
 - solder sealing a metal lid in the recess over the inserted SAW die for hermetically sealing the SAW die within the cavity; and then
 - separating the array into individual SAW devices along separation lines between adjacent cavities.

2. (Original) The method recited in Claim 1, further comprising the step of maintaining spacing between adjacent cavities during the separation step by applying tape means over the sealed lids and the first surface.

Claims 3 - 5 (Cancelled)

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6. (Previously Presented) The method recited in Claim 1, wherein the solder sealing step comprises the steps of:

 placing the lid over at least some of the plurality of spaced cavities;
 placing solder about a periphery of each lid; and then
 treating the array having the lids and solder thereon so as to hermetically seal each lid thereto.

7. (Previously Presented) The method recited in Claim 6, wherein the treating step comprises heating the array to effectuate sealing of the lids.

Claims 8 - 10 (cancelled)

11. (Previously Presented) The method recited in Claim 1, further comprising the steps of:

 placing a continuous tape across the first surface and the sealed lids prior to the separating step;
 undertaking the separating step from the second surface while maintaining continuity of the tape across the first surface; and then
 removing the individual components from the tape.

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12. (Previously Presented) The method recited in Claim 1, further comprising the step of forming the unitary array from a non-conductive material.

13. (Previously Presented) The method recited in Claim 12, wherein the unitary array comprises a ceramic.

Claim 14 (cancelled)

15. (Previously Presented) The method recited in Claim 1, wherein the lid sealing step comprises the step of hermetically sealing the cavity from an ambient environment.

Claims 16 - 18 (cancelled)

19. (Previously Presented) An assembly for manufacturing individual surface acoustic wave (SAW) devices comprising:

a unitary array of a nonconductive material having opposing first and second surfaces and a plurality of spaced cavities extending into the array from the first surface;
a SAW die carried face down, in a flip-chip arrangement, within at least some of the plurality of spaced cavities;

a recess formed around selected cavities extending from the first surface, at least two electrically conductive paths from the SAW die within each selected cavity to an at least one of the first and second surfaces of the array;

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a lid solder sealed in each recess of the selected cavities over the inserted SAW die for hermetically sealing the die therein; and

wherein the array is separated along separation lines between adjacent cavities to form individual SAW devices therefrom.

20. (Original) The assembly recited in Claim 19, wherein each recess has a dimension greater than that of the corresponding cavity in order to form an area of overlap, and wherein the lid sealed in each recess engages the area of overlap.

21. (Withdrawn) A method of manufacturing an array of hermetically sealed surface acoustic wave (SAW) devices, the method comprising the steps of:

providing a nonconductive material having opposing first and second surfaces; forming a plurality of spaced cavities extending into the material for providing an array thereof;

forming a recess into the material from the first surface around a periphery of selected cavities;

providing at least two conductive paths from within each selected cavity to at least one of the first and second surfaces thereto;

inserting a SAW die face down within the selected cavities in a flip-chip arrangement and attaching the die therein, wherein the die is electrically connected to

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the at least two conductive paths;

sealing a ceramic lid within the recess over the SAW die carried within the

selected cavities for hermetically sealing the die therein; and

separating the array into individual SAW devices along lines between adjacent cavities.

22. (Withdrawn) The method recited in Claim 21, wherein the ceramic lid sealing step comprises using at least one of a solder and glass sealing material.

23. (Withdrawn) The method recited in Claim 21, wherein the ceramic lid sealing step comprises the step of hermetically sealing the cavity from an ambient environment.